

Claims

[c1] What is claimed is:

1. A method for improving processing efficiency of pipeline architecture with a processor, the processor having:

a first functional unit for executing a calculation task;

a second functional unit for executing another calculation task; and

a control unit electrically connected to the first and the second functional units for generating a plurality of control signals to control the first and the second functional units;

the method comprising:

(a)executing a first calculation task with the first functional unit or the second functional unit;

(b)determining an executing time period of a second calculation task with the control unit according to the functional unit executing the first calculation task, an executing time period of the first calculation task, and whether the second calculation task depends upon a result of the first calculation task; and

(c)executing the second calculation task with the first functional unit according to the executing time period of

the second calculation task determined in step (b).

- [c2] 2. The method of claim 1 wherein the first functional unit executes a calculation task requiring a calculating time of one instruction cycle, the second functional unit executes a calculation task requiring a calculating time of two instruction cycles, the control signals control the first and the second functional units to execute the first calculation task within a first time period and a second time period, and to execute the second calculation task within the second time period and a third time period sequentially, the method further comprising:
- when the first calculation task is executed by the second functional unit within the first and the second time period and the second calculation task is executed by the first functional unit, if the second calculation task does not depend upon the result of the first calculation task, executing the second calculation task with the first functional unit within the second time period, if the second calculation task depends upon the result of the first calculation task, executing the second calculation task with the first functional unit within the third time period;
- when the first calculation task is executed by the first functional unit within the first time period and the second calculation task is also executed by the first functional unit, if the second calculation task does not de-

pend upon the result of the first calculation task, executing the second calculation task with the first functional unit within the second time period, if the second calculation task depends upon the result of the first calculation task, executing the second calculation task with the first functional unit within the third time period; and when the first calculation task is executed by the first functional unit within the second time period and the second calculation task is also executed by the first functional unit, executing the second calculation task with the first functional unit within the third time period.

[c3] 3.The method of claim 2 wherein lengths of the first, the second, and the third time periods are all equal to one instruction cycle.

[c4] 4.The method of claim 2 wherein the first, the second, and the third time periods are non-overlapping with one another.

[c5] 5.The method of claim 2 wherein the second time period is later than the first time period and the third time period is later than the second time period.

[c6] 6.A method for improving processing efficiency of pipeline architecture with a processor, the processor having:

a first functional unit for executing a calculation task requiring a calculating time of one instruction cycle;

a second functional unit for executing a calculation task requiring a calculating time of two instruction cycle; and

a control unit electrically connected to the first and the second functional units for generating a plurality of control signals to control the first and the second functional units, so as to execute a first calculation task within a first time period and a second time period, and to execute a second calculation task within the second time period and a third time period sequentially, lengths of the first, the second, and the third time periods being all equal to one instruction cycle, the first, the second, and the third time periods being non-overlapping with one another, the second time period being later than the first time period and the third time period being later than the second time period;

the method comprising:

when the first calculation task is executed by the second functional unit within the first and the second time period and the second calculation task is executed by the first functional unit, if the second calculation task does not depend upon the result of the first calculation task, executing the second calculation task with the first functional unit within the second time period, if the second calculation task depends upon the result of the first cal-

calculation task, executing the second calculation task with the first functional unit within the third time period; when the first calculation task is executed by the first functional unit within the first time period and the second calculation task is also executed by the first functional unit, if the second calculation task does not depend upon the result of the first calculation task, executing the second calculation task with the first functional unit within the second time period, if the second calculation task depends upon the result of the first calculation task, executing the second calculation task with the first functional unit within the third time period; and when the first calculation task is executed by the first functional unit within the second time period and the second calculation task is also executed by the first functional unit, executing the second calculation task with the first functional unit within the third time period.